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| 09/930,958 | 08/17/2001 | Vishnu K. Agarwal | M4065.0151/P151-B | 2289 |

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| EXAMINER |
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DOAN, THERESA T

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| ART UNIT | PAPER NUMBER |
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2814

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/930,958

Applicant(s)

AGARWAL ET AL.

Examiner

Theresa T Doan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 55,57,58,60,63-71,124 and 125 is/are pending in the application.

4a) Of the above claim(s) 63-71 is/are withdrawn from consideration.

- 5) ☒ Claim(s) 124 is/are allowed.

- 6) ☒ Claim(s) 55,57,58,60 and 125 is/are rejected.

- 7) ☐ Claim(s) _____ is/are objected to.

- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.

- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)

- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.

- 5) ☐ Notice of Informal Patent Application (PTO-152)

- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 60 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation of "the titanium layer has a thickness within the range of about 60 to about 100 Angstroms" in lines 1-2 is indefinite as where is the titanium layer located?

3. Claim 60 recites the limitation "the titanium layer has a thickness within the range of about 60 to about 100 Angstroms" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 55 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Okutoh et al. (6,180,974^I) as previously cited.

Regarding claim 55, Okutoh et al. teach in figure 16 a memory cell, comprising:

a substrate 221;

a transistor including a gate 222 on the substrate and a source/drain region (223/224) in the substrate disposed adjacent to the gate;

a capacitor comprising an electrode having a layer 229 comprising platinum-rhodium material and a non-oxide layer 230 comprising platinum material on top of the platinum-rhodium layer, wherein the electrode has a lateral surface aligned with the source/drain region; and

a conductive plug 227 providing electrical contact between the source/drain region 224 and the lateral surface of the electrode.

Regarding claim 57, Okutoh et al. teach the platinum-rhodium layer has a thickness of 100 to 500 Angstroms (column 8, lines 46-47).

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6. Claims 55 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Okutoh et al. (6,201,271) as previously cited.

Regarding claim 55, Okutoh et al. teach in figure 8 a memory cell, comprising:

a substrate 1;

a transistor including a gate (3,4) on the substrate and a source/drain region 5 in the substrate disposed adjacent to the gate;

a capacitor comprising an electrode having a layer 21 comprising platinum-rhodium material and a non-oxide layer 22 comprising platinum material on top of the platinum-rhodium layer²¹, wherein the electrode has a lateral surface aligned with the source/drain region; and

a conductive plug 19 providing electrical contact between the source/drain region 5 and the lateral surface of the electrode.

Regarding claim 57, Okutoh et al. teach the platinum-rhodium layer 21 has a thickness of 300 Angstroms (column 8, lines 63-64).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. Claims 58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okutoh et al. (6,201,271) as previously cited.

Regarding claims 58 and 60, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the platinum layer has a thickness within the range of about 50 to about 150 Angstroms and the titanium layer has a thickness within the range of about 60 to about 100 Angstroms in Okutoh et al.'s device, since it is a matter of design choice within the skills of an artisan, subject to routine experimentation and optimization.

9. Claim 125 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okutoh et al. (6,201,271) as previously cited in view of Dornfest et al. (6,358,810).

As so far understood, the combination of figures 1 and 8 of Okutoh et al. that teach the titanium layer 8 beneath the platinum-rhodium layer and a platinum layer (see the last office action on page 5 of claim 59).

Okutoh et al. do not teach a titanium nitride layer provided beneath a platinum-rhodium layer and a platinum layer. However, Dornfest et al. teach in column 4, lines 58-64 the equivalence of the diffusion barrier layer such as titanium nitride layer or titanium aluminum nitride layer can be used in place of titanium layer and the thickness between 50-500 Angstroms thick in order to prevent silicon in the substrate from diffusing through the electrode. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to substitute titanium

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nitride for titanium layer in Okutoh's device. Because the substitution of art recognized equivalent as suggested by Dornfest et al. is within the level of ordinary skill in the art.

Reasons for Allowance

10. Claim 124 is allowed.

11. The following is an examiner's statement of reasons for allowance:

The prior art of record fails to disclose all the combination of a memory cell as claimed, including a capacitor comprising an electrode having a titanium layer beneath a platinum-rhodium layer and a platinum layer on top of the platinum-rhodium layer, wherein a titanium nitride layer is provided beneath the titanium layer.

Response to Arguments

Applicant argues that Okutoh I and Okutoh II fail to teach a capacitor comprising an electrode having a layer comprising platinum-rhodium material and a non-oxide layer comprising platinum material on top of the platinum-rhodium layer. The argument is not persuasive because Okutoh I teaches in figure 16 a memory cell, comprising: a capacitor comprising an electrode having a layer 229 comprising platinum-rhodium material and a non-oxide layer 230 comprising platinum material on top of the platinum-rhodium layer. And Okutoh II teaches in figure 8 a memory cell, comprising: a capacitor comprising an electrode having a layer 21 comprising platinum-rhodium material and a non-oxide layer 22 comprising platinum material on top of the platinum-rhodium layer.

The rest of applicant's arguments, addressed to the amended claims are considered in the rejections shown above.

Conclusion

Applicant's amendment of claim 125 is necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Theresa T Doan whose telephone number is (703) 305-2366. The examiner can normally be reached on 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WAEL FAHMY can be reached on (703) 308-27944918. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

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308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TD
February 20, 2003


PHAT X. CAO
PRIMARY EXAMINER